

A COMPARISON OF PROCEDURES TO REDUCE SELF-ABUSIVE
BEHAVIOR IN AN INSTITUTIONALIZED MALE

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The Problem. The existence of self-abusive behavior among mentally retarded individuals is a continuing challenge for those who work with them. Several treatment techniques are available for reducing or eliminating such behaviors. Aversive stimuli such as shock or aromatic ammonia capsules have proven effective in eliminating self-abusive behaviors. Most settings do not allow the use of aversive stimuli without first exhausting less intrusive possibilities. Of these, overcorrection, has reduced self-stimulatory behaviors. In the present study three self-abusive responses were measured. Later one response was discontinued while the other two remained in baseline.

Procedure. Sessions were held in several settings within the hospital. One female Psychiatric Technician and one female Laboratory Technician acted as data collectors on alternate days. Three responses were recorded: striking fist to forehead, knee to forehead and head banging. Six experimental conditions were used: Baseline I, Positive Practice Overcorrection, Baseline II, Cold Water Squirt I, Baseline III, and Cold Water Squirt II. Reliability was measured ten times and averaged 98%.

Findings. Fist to forehead responses decreased during treatment. Knee to forehead responses also decreased as did head banging.

Conclusions. Both positive practice overcorrection and a squirt of water to the cheek reduced the rate of fist to forehead responses. Response generalization was demonstrated with knee to forehead and head banging during both overcorrection and squirt bottle conditions.

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Sharon Kirkpatrick
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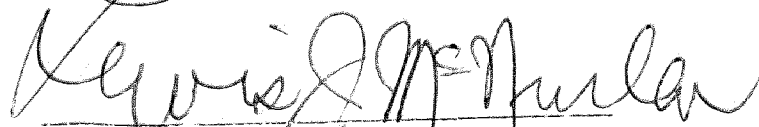
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CHAPTER I

INTRODUCTION

The existence of self-abusive behavior among mentally retarded individuals is a continuing challenge for those who work with them. These individuals slap or scratch themselves (Tanner & Zeiler, 1975; Lovaas & Simmons, 1969), bang their heads, pull hair and bite fingers (Corte, Wolf, & Locke, 1971; White, Nielsen, & Johnson, 1972; Tate & Baroff, 1966).

Several treatment techniques are available for reducing or eliminating such behaviors. The effects of extinction, differential reinforcement of other behavior, and electric shock were compared for eliminating face slapping, scratching, hair pulling and finger biting (Corte et al., 1971). Extinction was ineffective, differential reinforcement of other behavior was effective only with prior food deprivation, and shock was effective in eliminating self-abusive responses in all four subjects. In a similar study, one subject struck himself almost 9000 times before the behavior extinguished (Lovaas & Simmons, 1969). Using extinction could permit severe injury to a person.

Aversive stimuli such as shock or aromatic ammonia capsules have proven effective in quickly eliminating self-abusive behaviors (Tanner & Zeiler, 1975; Lovaas & Simmons, 1969). Most settings do not allow the use of aversive stimuli without first exhausting less intrusive possibilities.

One of these, overcorrection, has reduced self-stimulatory behaviors (Foxx & Azrin, 1973; Epstein, Doke, Sajwaj, Sorrell, & Rimmer, 1974). A person is physically prompted to practice appropriate forms of the behavior consequated contingent on an inappropriate response. A person engaging in stereotyped arm waving would be prompted to practice appropriate arm movements for several minutes, i.e., positive practice overcorrection (Foxx & Azrin, 1973).

If a treatment does decrease the frequency of occurrence of a self-abusive behavior in one situation it may not affect the frequency of the behavior in other situations, and treatment must be programmed to achieve its reduction in other situations (Rusch, Close, Hops, & Agosta, 1976; Corte et al., 1971).

Another consideration in selecting a treatment procedure is response generalization, i.e., punishment of one response may result in the reduction of other responses, either appropriate or inappropriate ones. This occurs most commonly when responses are interrelated (Kazdin, 1973). A multiple baseline design may be ineffective in verifying a treatment variable if responses are so interrelated that if one is consequated, the rate of another will also change even though no contingency is in effect. In such a case a reversal design would be more appropriate. In a multiple baseline design (Corte et al., 1971) the baseline frequency of two or more responses are measured. Then treatment is

initiated in one response while the others remain in baseline. If a change in frequency occurs in the first but not in the other responses, the independent variable used for Response 1 is assumed to be the contingency responsible for the change in behavior.

In a reversal design, a treatment variable is introduced contingent on a behavior and later withdrawn. If the frequency of the behavior changes during treatment and returns to approximately the baseline rate when treatment is withdrawn, this indicates the treatment variable was effective in controlling the behavior (Favell & McGimsey, 1978).

In the present study three self-abusive responses were measured in baseline. The first treatment was positive practice overcorrection. The second treatment was squirting cold water on the subject's cheek. The treatment was applied to only one response. The other two responses remained in baseline throughout the study.

CHAPTER II

METHOD

Subject. William was a 41 year old male Caucasian admitted to Custer State Hospital in 1968. He had been diagnosed as retarded as a result of encephalitis at the age of nine months. William could walk with no support and had normal hand use. Although he did not dress himself or toilet himself, he fed himself under supervision.

William had exhibited several self-abusive behaviors almost thirty years. While living at home (until the age of thirty) his mother fashioned restraints to prevent his self-abusive responses. His hands, feet and torso were tied to a wheelchair, and an inner tube was placed around his forehead to prevent banging his head on solid objects.

At the time of the study William exhibited three self-abusive behaviors: striking his forehead with his fist, striking his forehead with his knee, and banging his head against solid objects. It was the author's observation that the self-abusive behaviors were maintained by staff attention, that is, William received large amounts of social reinforcement when staff members tried to stop his self-abusive behaviors. He was restrained in a wheelchair when not being dressed, bathed, or fed. During these unrestrained periods he self-abused, and consequently had a bruised forehead most of the time. When not restrained he needed constant supervision.

If self-abusive behaviors were significantly reduced or eliminated William would be taught basic self-help skills such as toileting, bathing with supervision, dressing, and feeding in a group setting.

Setting. Sessions were held in several settings within the hospital depending upon availability of specific rooms. One 20 by 40 foot room with a large table and chairs and two similar 15 by 30 foot rooms with assorted tables, desks and chairs were used. The timed session would begin after William was brought to the author's office and a stopwatch, data sheet, and pen necessary for collecting data were assembled.

One female Psychiatric Technician and one female Laboratory Technician acted as data collectors on alternate days throughout the study. Both would take data on days when reliability was measured. The data collectors took several sessions of data prior to beginning the study to assure agreement of response definitions and scoring procedures.

The author and a data collector would jog in the halls with William for approximately ten minutes at the beginning of every session for William's daily exercise. William would then be taken to one of the available rooms to work on shape discrimination puzzles, color discrimination puzzles and towel folding tasks. After approximately thirty minutes William was returned to his chair and his

restraints retied. The timed session ended after the last restraint was tied.

Response Definitions. Three responses were recorded.

They were:

Fist to forehead: striking either fist to the forehead such that the contact to the forehead could be seen or heard by the data collector.

Knee to forehead: striking either knee to the forehead such that contact to the forehead could be seen or heard by the data collector. William emitted this response in either a standing or sitting position.

Head banging: striking any portion of the head on any solid object exclusive of his fists or knees such that contact could be seen or heard by the data collector. This included floors, walls, doors, other people and furniture.

Recording Procedure. The frequency of occurrence of fist to forehead, knee to forehead, and head banging were recorded as tally marks on a data sheet where total session time and individual tallies and response rates were recorded. The frequency of each response was divided by the total session time in minutes to compute the rate measures.

Procedure. Six experimental conditions were used. They were Baseline I, Treatment I, Baseline II, Treatment II, Baseline III, and Treatment III.

Baseline I. This condition lasted 16 sessions during which the trainer supervised jogging, puzzle completion and towel folding. The data collector recorded fist to forehead, knee to forehead, and head banging responses while standing or seated at a distance of approximately ten feet from William and the trainer. The data collector kept William in profile to better see responses. Instructions to complete the task at hand were given periodically. No instructions were given for self-abusive responses. All self-abusive responses were ignored. On several occasions when William was lying on the floor banging his head he was physically prompted to stand up. On days when self-abusive responses resulted in tissue damage the sessions were terminated and William was restrained in his chair.

Treatment I. During this phase positive practice over-correction (Foxx & Azrin, 1973) was initiated contingent on fist to forehead responses. Data were collected as in baseline. When a fist to forehead response occurred the trainer said "No hitting!" and then said "Arms out" (up, down, back, forward or in lap) and physically prompted William's arms into the position named for 30 seconds. A total of four arm positions were used for each application

of overcorrection, i.e., for a total of two minutes for each fist to forehead response. The order of presentation of instructions was varied haphazardly to prevent a specific prompt from becoming a discriminative stimulus for the next verbal prompt. All three responses were recorded. Overcorrection was in effect for eleven sessions. Time spent in overcorrection was subtracted from total session duration.

Baseline II. During this phase, which lasted five sessions, the procedure was the same as in Baseline I, i.e., self-abusive responses were ignored and overcorrection was not employed. All three responses were recorded.

Treatment II. In this condition a one second spurt of cold water to either cheek was contingent on fist to forehead responses. The trainer first said, "No hitting", and then gave a one second spurt of water from a distance of approximately three feet, which was the usual distance between trainer and William.

After being squirted, William would wipe his forehead with a washcloth which he normally used for wiping his chin when drooling.

A Science brand, one pint, plastic spray bottle with the adjustable nozzle turned to a straight line of spray was used. The bottle was the type commonly available in supermarkets for household use. It measured 25 cm high by 7.5 cm in diameter. Between sessions the water bottle was chilled

in a refrigerator. All three responses were recorded. Treatment II was in effect for 21 sessions.

Baseline III. This phase was the same as Baseline II. It lasted five sessions. All three responses were recorded.

Treatment III. The squirt bottle procedure was used as in Treatment II for 12 sessions. All three responses were recorded.

Throughout the study, only fist to forehead responses were consequated. Knee to forehead and head banging responses were always in baseline. The rates of these latter behaviors provided a test for response generalization.

Reliability. Reliability was defined as the smaller frequency (from either observer) per behavior divided by the larger frequency multiplied by 100. The first reliability measure in Session 34 during Baseline II indicated 60% agreement. Thereafter reliability ranged from 91% to 100%. Reliability was measured for 10 sessions. During Treatment II reliability was 98%, during Baseline III reliability was 98% and during Treatment III reliability was 97%.

CHAPTER III

RESULTS

Figure 1 shows the frequency per minute of all three responses in all experimental conditions. Fist to forehead responses decreased from a median of 1.9 responses per minute during Baseline I to a median of three responses per minute over eleven sessions of overcorrection.

During Baseline II the rate of fist to forehead responses increased to a median of 3.7 responses per minute, a level greater than that observed in Baseline I. This has been called a punishment contrast effect (Azrin & Holz, 1966). The rate of fist to forehead responses decreased to a median of 0.4 responses per minute during the squirt bottle phase. The median fist to forehead response rate during Baseline III was 1.7. Responses per minute decreased to 0.25 responses per minute during the final squirt bottle phase (Treatment III).

Figure 1 also shows response rates for knee to forehead and head banging responses. These behaviors were never sequated. Knee to forehead responses decreased from 0.7 in Baseline I to 0.2 during the overcorrection phase for fist to forehead phase, and from 0.4 to 0.0 responses per minute in Baseline II to the first squirt bottle phase for fist to forehead responses.

Head banging decreased from 1.1 in Baseline I to 0.0 during overcorrection for fist to forehead, and decreased from

5.2 in Baseline II to 0.0 in Squirrt Bottle I. The lower panel of Figure 1 also showed session duration in minutes to show that response rates did not covary as a function of session length.

Table 1 shows the median and range of response rate per experimental condition. Each of the three treatment conditions resulted in similar median rates for fist to forehead responses indicating that all treatment conditions were about equally effective. The generalization data of knee to forehead and head banging responses also showed similar median rates between treatment conditions.

A punishment contrast effect was noted on head banging in Baseline II, (bottom panel, Figure 1)(Azrin & Holz, 1966). Median responses per minute were 1.1 in Baseline I, and 5.2 in Baseline II. The change in response rate for head banging generalized from consequence of fist to forehead responses since head banging responses were never consequence. This could be termed a generalized punishment contrast effect. No previous mention of this effect has been noted in the literature.

CHAPTER IV

DISCUSSION

Both positive practice overcorrection and a squirt of water to the cheek reduced the rate of fist to forehead responses. It must be noted that fist to forehead responses were decreasing throughout Baseline I. Overcorrection was begun on Session 17 despite this decreasing trend since the high rate of head banging during Session 16 had resulted in tissue damage to William's forehead. The decision was made to protect the resident rather than wait for a possible increasing trend in the data.

The rate of fist to forehead responses increased slowly during overcorrection. A median of eight consequated fist to forehead responses occurred during these sessions. The trainer was physically prompting William 16 to 20 minutes (at 2 minutes of overcorrection per response) per session. The decision to change to Baseline II and then to the squirt bottle phase was twofold. First, physically prompting an adult for 20 minutes per session of arms up, arms out, etc. became extremely tiring to the trainer who was completing the overcorrection movements herself plus supporting the weight of William's arms. Secondly, the slowly increasing rate of fist to forehead responses suggested that the physical contact during overcorrection could have acted as a reinforcer. The advantage of using the squirt bottle was the removal of the

possibly reinforcing physical contact that occurred with overcorrection. This offset the disadvantage of carrying an easily discernable object which may have acted as a cue for non-responding.

A regular toy squirt gun would be effective in generalizing the treatment effects to other settings and staff members. If necessary, squirt guns concealed in the pockets of several staff members trained to carry out the procedure could be used. The client would be less likely to discriminate which staff members were armed and stimulus generalization would be more likely. Generalization to other situations and staff were not tested. All data were taken in the presence of the trainer and data collectors, and William was restrained the rest of the day other than dressing, feeding, and bathing.

Response generalization was quickly demonstrated with knee to forehead and head banging responses during both overcorrection and squirt bottle I and II phases. These responses were apparently in the same response class as fist to forehead responses. The behaviors were not a response chain, however. Figure 1 shows the daily variation between rates of the different self-abusive responses, especially evident in baseline. A chain of self-abusive responses would have shown more similarity between the different response rates during any given session.

Positive practice overcorrection generalization has been noted in several studies. Reduced rates of inappropriate searching of drawers generalized to a control session (Rusch et al., 1976), and the effectiveness of hand overcorrection for inappropriate hand movements generalized across response classes when consequating inappropriate foot movements and inappropriate vocalizations (Epstein et al., 1974). Response generalization to nonconsequated responses using positive practice overcorrection has not been noted in the literature, however.

A punishment generalization contrast effect was noted in head banging responses during Baseline II. This appears to be a non-documented effect acting similar to punishment contrast in a consequated response. Further work in nonprogrammed response generalization using punishment procedures may verify this effect.

Both positive practice overcorrection and water on the cheek significantly reduced but did not totally eliminate fist to forehead responses. It would appear that a more aversive punishing stimulus and/or more opportunities to be reinforced for appropriate behaviors would be necessary to completely eliminate William's self-abusive behavior. Inappropriate staff attention for self-abusive responses needs to be eliminated as well, since by implication this

attention appears to be an important contingency maintaining the self-abusive behavior. Staff training in basic operant principles is planned to help correct this and other cases of social reinforcement for inappropriate behaviors.

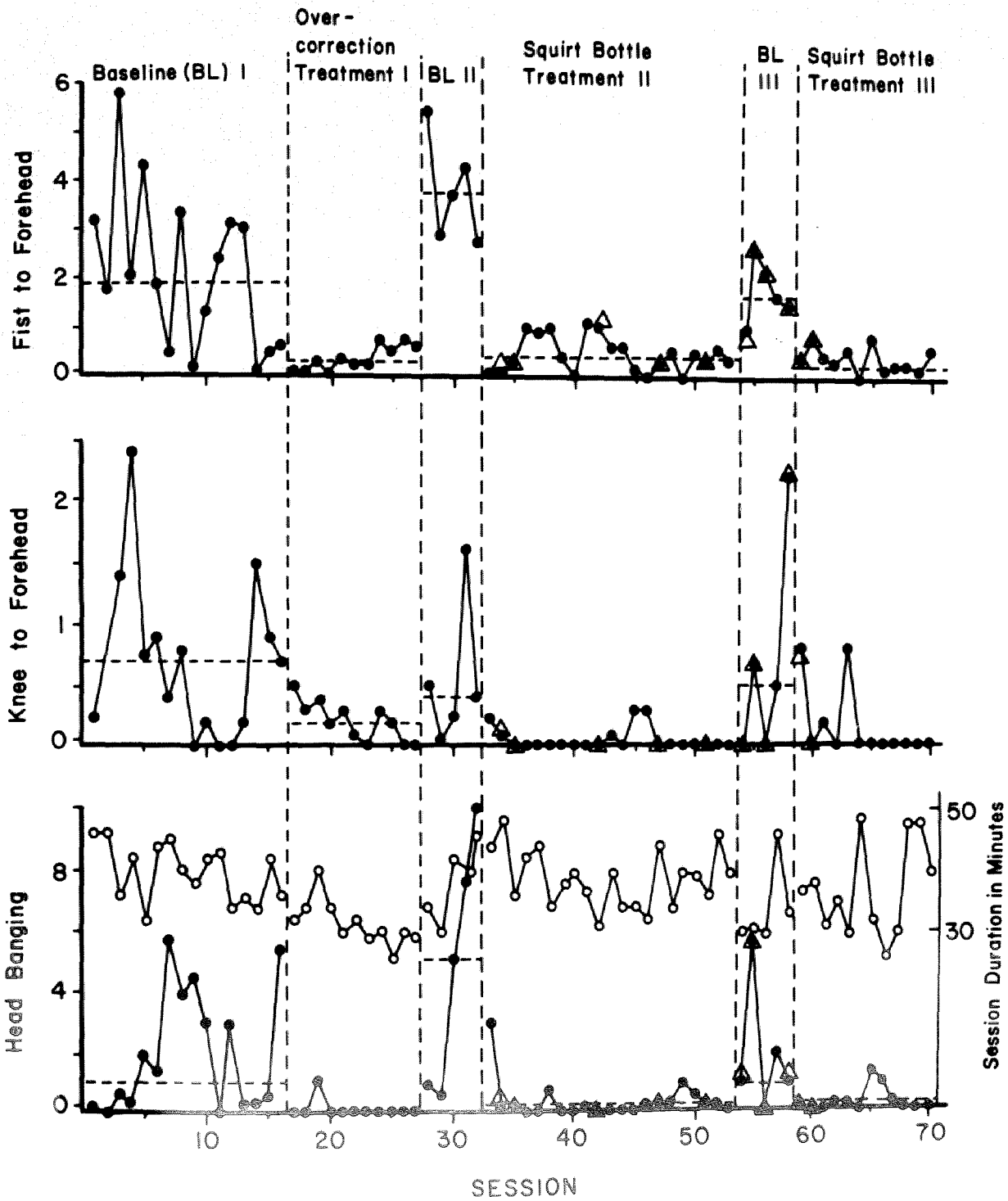


Table 1

Medians and Ranges of Response Rates of Experimental Conditions for the Three Self-Abusive Responses. Only Fist to Forehead Responses Were Consequated. Experimental Conditions for Knee to Forehead and Head Banging Refer to Conditions for Fist to Forehead Only.

Response	Experimental Condition	Median	Range
Fist to Forehead	Baseline I	1.9	5.7
	Overcorrection	0.3	0.7
	Baseline II	3.7	2.6
	Squirt Bottle I	0.4	1.1
	Baseline III	1.7	2.4
	Squirt Bottle II	0.3	0.8
Knee to Forehead	Baseline I	0.7	2.4
	Overcorrection	0.2	0.5
	Baseline II	0.4	1.5
	Squirt Bottle I	0.0	0.3
	Baseline III	0.5	2.4
	Squirt Bottle II	0.0	0.8
Head Banging	Baseline I	1.1	5.8
	Overcorrection	0.0	1.2
	Baseline II	5.2	9.8
	Squirt Bottle I	0.1	3.1
	Baseline III	1.1	5.4
	Squirt Bottle II	0.1	0.7

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APPENDIX

APPENDIX A

LITERATURE REVIEW

In an institutionalized setting, some residents will exhibit behaviors which may result in injury to themselves. These residents scratch or slap themselves (Tanner & Zeiler, 1975; Lovaas & Simmons, 1969), bite themselves or pull their own hair (Corte, Wolf, & Locke, 1971), and bang their heads on solid objects (Tate & Baroff, 1966).

Contingencies maintaining these behaviors vary, and may be manipulated to increase or decrease their frequency. The rate of self-abusive behavior in one child was increased by presentation of attention contingent on self-abuse (Lovaas & Simmons, 1969). This study provided verification of what has been suspected for some time; that inappropriate presentation of social attention and edibles to distract and/or stop self-abusive behaviors were in effect increasing the probability that they would continue to occur.

Different professional approaches to working with the mentally retarded state different reasons for the existence of self-abusive behavior. One approach from the viewpoint of occupational therapy states that self-abusive behaviors are due to sensory deprivation. Upon presentation of a program of sensory stimulation decreased rates of self-abusive behaviors were noted (Lemke, 1974). The discussion section of the study warns not to reinforce the inappropriate behaviors

with stimulation. The application of treatment, if not the reasoning behind it coincides with the behavioral viewpoint of not reinforcing inappropriate behaviors. The approach is consistent with the techniques of differential reinforcement of other behaviors, which has been used to reduce the rates of self-abusive behaviors.

Vibration was used contingent on a lever pressing response in a profoundly retarded, self-abusive child (Bailey & Meyerson, 1969). Self-abusive behaviors were not consequated. The rate of lever pressing responses increased when the contingency was in effect, providing bed vibration for six seconds per response. The implication was a decrease in self-abusive behaviors due to the increased rate of an incompatible response, although no data was presented.

The combination of differential reinforcement of other behavior paired with 30 seconds of timeout was effective in reducing aggressive and self-abusive responses of institutionalized children (Repp & Deitz, 1974). Another study used a multiple baseline design to compare the effectiveness of extinction, electric shock and differential reinforcement of other behavior. Differential reinforcement of other behavior was effective only with food deprivation, and then only with one of our subjects (Corte et al., 1971). Shock was immediately effective on all subjects, but extinction was ineffective in significantly reducing self-abusive responses.

Extinction has not been widely used to reduce self-abusive responses due to the possibility of injury during a long extinction run. A child hit himself almost 9000 times before his self-abusive behaviors extinguished (Lovaas & Simmons, 1969). In most settings this would not be practical, ethical, or even allowed to occur without exhausting all alternatives first. Another problem is using extinction on self-abusive behavior is that it is commonly situation specific and the person discriminates an extinction setting from a non-extinction setting. The reinforcers maintaining self-abusive behaviors are still operative on the wards and other settings, so extinction would need to be applied in all settings if no generalization occurred.

Punishment has been shown more effective in reducing self-abusive behavior than either differential reinforcement of other behavior or extinction. Timeout is a form of punishment defined as the withdrawal of reinforcement for a relatively short time contingent on a self-abusive (or any other undesirable) response. A three minute timeout procedure reduced aggressive behaviors of chokes, arm wraps, and attacks on people and materials by an eight year old using both continuous and intermittent schedules of punishment (Clark, Rowbury, Baer, & Baer, 1973). Self-hitting, kicking and head banging were reduced but not eliminated using timeout in an experiment which compared the use of timeout

and electric shock. Electric shock eliminated the self-abusive behaviors almost immediately (Tate & Baroff, 1966). In some instances timeout may act as a reinforcer rather than a punisher (Solnick, Rincover, & Peterson, 1977). Tantrum behaviors increased significantly as a result of contingent timeout in a six year old girl. In timeout the subject self-stimulated, which provided its own reinforcement. Timeout was effective only when the subject was physically prevented from self-stimulating. When using timeout, the subject must not have access to reinforcement if timeout is to be effective. In the case of persons who self-stimulate, precautions must be taken to ensure the absence of reinforcement for the duration of timeout.

The use of electric shock has consistently shown the quickest and most complete response suppression. As stated earlier, when comparing extinction, differential reinforcement of other behavior, and electric shock contingent on self-abusive responses, only shock completely and immediately suppressed responding (Corte, et al., 1971). Shock was more effective than timeout in reducing self-hitting, kicking, and head banging (Tate & Baroff, 1966), and immediately effective in reducing similar behaviors for Lovaas and Simmons (1969). In this study, which compared shock to extinction, one subject who exhibited less severe self-abusive behaviors struck himself almost 9000 times before the be-

havior extinguished. For those who exhibit more severe behaviors, extinction could not be considered a viable alternative. It must be noted that when shock was discontinued the self-abusive behavior began to recover unless shock was administered several times during the recovery period. Response reduction was selective across different settings, so shock, as with other treatment methods, would need to be programmed in other settings as well. Electric shock, then, appears to be the quickest and most effective method for eliminating self-abusive behaviors.

The effectiveness of shock has been hampered by the legal restrictions of its use in applied settings. Many places do not allow its use at all, while those that do allow limited usage state that it is to be used only after less restrictive measures have failed.

One unusual method which proved effective was the use of five minutes of physical restraints contingent on five minutes of non-abuse (Favell, McGimsey, & Jones, 1978). The physical restraints were effective as a reinforcer for what amounts to differential reinforcement of other behavior. In comparing the use of lemon juice in the mouth contingent on self-abuse to lemon juice for self-abuse and restraints for non-abuse, lemon juice plus restraints decreased eye poking and arm biting to almost zero. Contingent restraints for non-abuse was also shown effective with an eight year old boy.

Another relatively recent punishing stimulus is the use of aromatic ammonia capsules contingent on self-abusive behavior (Tanner & Zeiler, 1975). In a reversal design it was shown that face slapping was reduced from a mean of 36 to 1 response per minute when a crushed capsule was held under the subject's nose for several seconds contingent on self-abuse. The capsules were more easily concealed than an electric inductorium, and several staff could carry them, making punishment discrimination difficult and generalization more likely.

Positive practice overcorrection is another procedure for reducing self-stimulatory behaviors which may also be applicable to self-abusive behaviors (Foxx & Azrin, 1973). Object and hand mouthing, head weaving and excessive hand clapping were all reduced by overcorrection. Overcorrection is defined as contingent practice of appropriate movements contingent on inappropriate behavior. A trainer would physically prompt appropriate arm or head positions for up to five minutes following an inappropriate response such as head weaving. Avoidance of overcorrection was used successfully to increase the rate of eye contact in autistic and retarded children (Foxx, 1977). Overcorrection contingent on non-compliance to "look at me" paired with praise and edibles was more effective than praise and edibles alone. Overcorrection as a negative reinforcer can be effective

when autistic or retarded children are not responsive to positive reinforcers.

Inappropriate searching through drawers was decreased using overcorrection, and decreased rates of searching were maintained in a maintenance stage of verbal reprimands alone (Rusch et al., 1976). The effects of overcorrection generalized to a control session. Overcorrection has also been shown effective in reducing behaviors of a response class unrelated to the type of overcorrection used. That is, hand overcorrection was successfully used to decrease the rate of inappropriate foot swinging and pounding (Epstein et al., 1974).

Stimulus generalization has been noted in the use of control sessions (Rusch et al., 1976), but response generalization has not been noted. Response generalization is more likely to occur if the responses are highly interrelated (Kazdin, 1973). When this is the case, the experimental design must be considered. If response generalization occurs, a multiple baseline would not show a clear-cut verification of the effectiveness of the independent variable whereas a reversal might.

Response generalization is an exception rather than the rule, and generalization must often be programmed either across behaviors or settings. In the present study three

highly related self-abusive responses were recorded. Response generalization was a possibility, so a reversal design was used for the most effective verification of the procedures used.

The use of a squirt of water to the face contingent on a self-abusive response has not been previously documented. Its use was based on subjective observations that the subject of the study would avoid cold water if possible. A quick, easily applicable aversive stimulus was needed to reduce the rate of his self-abusive behaviors.